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ABSTRACT

Preliminary findings from a study to develop a plan for a community educational television (ETV) system in Appalachian Maryland demonstrate the feasibility of integrating the ETV project and the Appalachian Applied Technology Satellite-F (ATS-F) experiment in inservice training for rural teachers. Through the community ETV project, undertaken by the Regional Education Service Agency (RESA) of Appalachian Maryland (a voluntary cooperative of public education institutions serving Allegany, Garrett, and Washington counties), potential client groups and their interests and needs have been identified and existing networks of instructional television in public schools, commercial cable television companies, and the Public Broadcast Service have been cataloged. The ATS-F experiment of the Appalachian Regional Commission plans to use educational technology to strengthen existing local education programs in elementary reading and career education through inservice education for improving teaching skills via satellites and other communications systems. Since the ATS-F experiment will exert a strong influence on development of regional ETV, it was recommended that the experiment be implemented as the basis for the ETV system; specific recommendations for each of the three counties is given. (RS)

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REGIONAL EDUCATION SERVICE AGENCY
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THE APPALACHIAN ATS-F SATELLITE EXPERIMENT AS THE KERNEL FOR THE APPALACHIAN MARYLAND COMMUNITY ETV STUDY

U.S. DEPARTMENT OF HEALTH
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THE APPALACHIAN ATS-F SATELLITE EXPERIMENT AS THE KERNEL FOR THE APPALACHIAN MARYLAND COMMUNITY ETV SYSTEM[1]

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ABSTRACT

This paper explores the interface between the Regional Education Service Agency study on regional cooperation in educational television for Appalachian Maryland and the Appalachian Applied Technology Satellite - F experiment in in-service training for rural teachers. This paper both documents progress made to date on the RESA-ETV study and presents the goals and preliminary plans for the ATS-F experiment. Since the ATS-F experiment will exert a strong influence on the development of regional ETV, it is proposed that the experiment in Appalachian Maryland be planned as the basis for the ETV system. Recommendations for implementing the experiment as a kernel for the community ETV system are presented.

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[1] This report is based on preliminary findings from a study to develop a plan for a community ETV system in Appalachian Maryland, under contract to the Regional Education Service Agency of Appalachian Maryland.

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INTRODUCTION

A topological analysis of Appalachia would clearly relate its inadequacies in health services systems, in educational programs and special services, and in employment opportunities to its rural isolation. Indeed, as a macro-organism, Appalachian communities are not only topographically isolated from the rest of the nation, but are similarly isolated from each other. Here busing is not implemented to reorganize from defacto segregated neighborhood schools to integrated local school systems, but rather to bring the child to his neighborhood school. Here is not the situation of youth leaving the family environment while remaining comfortably within the community, but rather one of youth leaving the community while longing to remain within the family environment. Here, in an era of inter-planetary communications, is a region where the topography prevents a terrestial based communications system from integrating its educational needs.

The educational television (ETV) concept, in its broadest sense, will satisfy the comprehensive communications needs of the isolated community. In particular, ETV can serve the needs of each group—preschool, in-school and out-of-school children, education and health professionals, police and fire forces, social service recipients, businessmen, the general community—through specialized programming and inservice training. Fellows (1966, p. 8) suggested this approach seven years ago:

> ...educational television could be of tremendously significant value to the people of Appalachia if it were to direct a major portion of its programming to very basic needs of Appalachia's educationally needy persons.

The Regional Education Service Agency (RESA) of Appalachian Maryland, under sponsorship of the Appalachian Regional Commission (ARC), has accepted as its mission the integration of isolated individual community needs for educational programming into an area-wide community ETV system. The RESA system intends to address health, education and social needs in Allegany, Garrett and Washington counties of Maryland, and the adjoining communities in Pennsylvania and West Virginia.

THE RESA COMMUNITY ETV PROJECT

RESA of Appalachian Maryland is a voluntary cooperative of public education institutions serving Allegany, Garrett and Washington counties, and those regional and state agencies or organizations concerned with human

development in the three counties. Its purposes are to determine regional educational needs, to design and implement regional educational programs to meet these needs, and to coordinate the efforts of the cooperative agencies and organizations. Within this milieu RESA undertook its community ETV project.

This report is concerned with preliminary findings from the ETV project as it interfaces with the Appalachian ATS-F Satellite experiment in in-service teacher training. The purpose of the ETV study is to examine the ETV needs of the region, to catalog the existing ETV assets, to define a model system and to recommend an administrative schedule for implementing and operating the system. The specifics of this phase are:

- Catalog Needs and Usage Patterns
- Catalog Availability of Hardware Resources
- Catalog Software Deficiencies
- Research Historical Data on Hardware/Software/Developmental Costs
- Plan for Phased Implementation of a System.

Table 1 displays the potential client groups to be served by the community ETV system and some of their immediate interests and/or needs. The needs are being established from documented sources, such as public education goals and needs (Maryland State Department of Education, 1972 and 1972.a; Hershkowitz, 1972), and from surveys and interviews, such as the interests and viewing habits of disadvantaged families (Regional Education Service Agency of Appalachian Maryland: Interests and Viewing Habits Interview Guide).

The community has considerable system resources available upon which to develop its ETV delivery system. Figure 1 displays the existing public school instructional television network within each of the three counties. All public schools in Washington County are connected to a central instructional television (ITV) facility through a closed circuit system. Under an administrative agreement between the Board of Education and Antietam Cable TV of Hagerstown, Maryland, all Washington County public schools are also cable-connected. About 80% of the public elementary and secondary schools in Allegany County are equipped with TV, but are not connected to a central ITV facility. Under an administrative agreement between the Board of Education and Potomac Valley Television Company of Cumberland, Maryland, the TV-equipped schools of Allegany County are cable-connected. None of the Garrett County public schools are equipped for ITV or cable-connected; however, the Board of Education maintains two video tape recorders and TV monitors for use in the schools.

TABLE 1

POTENTIAL CLIENT GROUPS: THEIR INTERESTS AND NEEDS

GROUPS	INTERESTS AND/OR NEEDS
Students	Critical educational needs; Special education programming; Resource materials
Teachers and Administrators	In-service training; Information dissemination; Resource materials
General Public	General interest programming; Board nonspecific social improvement; Health education
Disadvantaged Groups	Consumer education; Health and nutrition education; General purpose social and economic improvement
Business and Industry	Management programs; Professional and technical improvement programs
Public Service Groups (government, public safety, National Guard)	Management programs; Technical public service programs
Health Service Groups	Professional and paraprofessional in-service programs; Resource materials

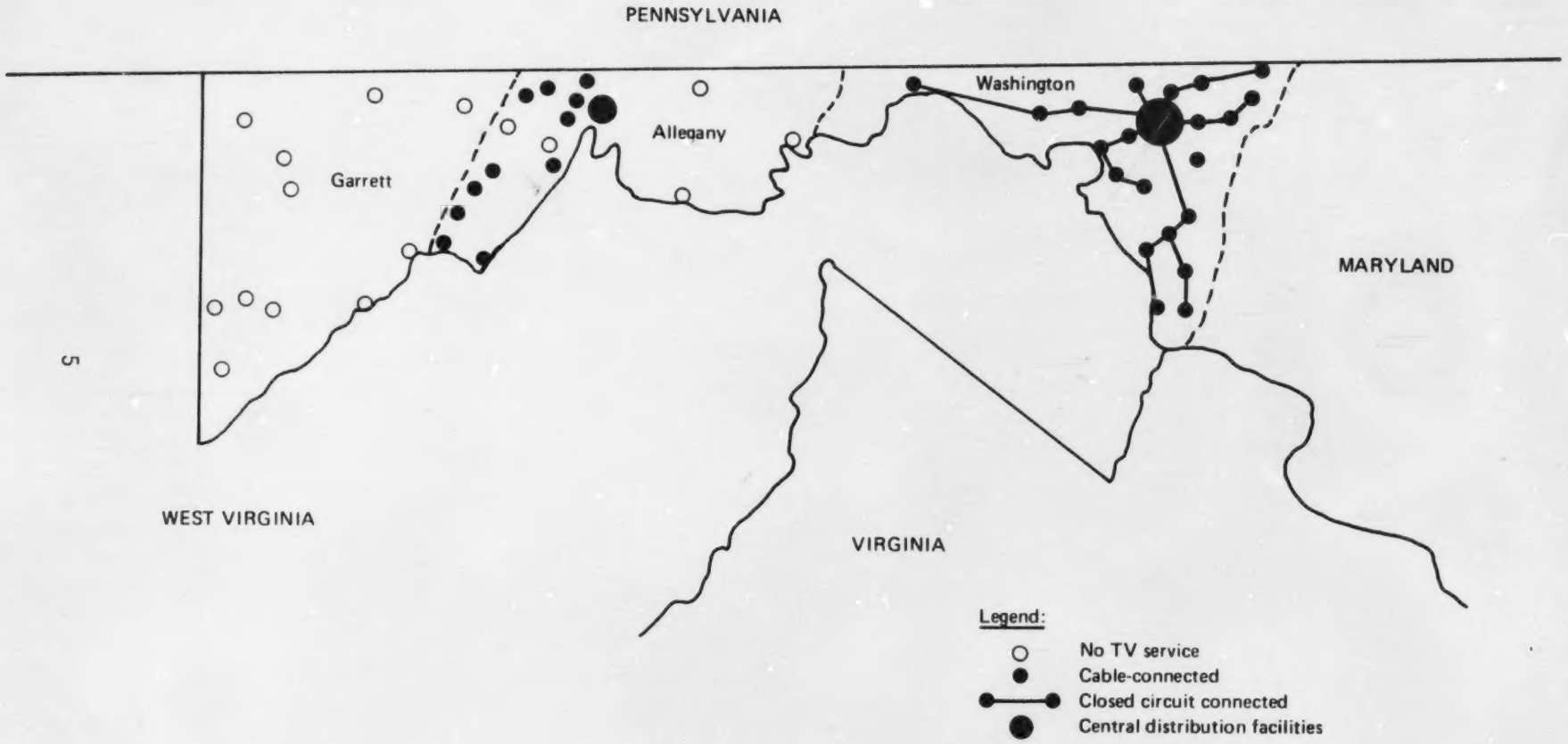

FIGURE 1. APPALACHIAN MARYLAND PUBLIC SCHOOL INSTRUCTIONAL TELEVISION NETWORK

In addition to the Appalachian Maryland public school systems, Allegany Community College is equipped with TV receivers, one-half inch TV cameras and video tape recorders, and is cable-connected to Potomac Valley Television Company through which it can receive and transmit; Frostburg State College is serviced by Frostburg Cable Television, Inc.; Upper Potomac Television Company, Inc., of Piedmont, West Virginia, supplies ETV to four grade schools and two high schools in adjacent West Virginia; Bedford Improved TV, Inc., of Bedford, Pennsylvania, supplies two schools in adjacent Pennsylvania; Potomac State College in adjacent West Virginia is fed by the Keyser Television Company, Inc.

Figure 2 displays the existing commercial cable television (CATV) companies in Appalachian Maryland and in adjacent Pennsylvania and West Virginia. There are 14 CATV companies serving 45,000 subscribers in the eight involved counties of Maryland, Pennsylvania and West Virginia. Thus while 95% of the tri-state population (380,000) have TV receivers, only 35% are cable-connected. Western Maryland Communications, Inc., a CATV microwave distributing company, serves Allegany County through Frostburg Cable Television, Inc. (2,600 subscribers); Allegany and Mineral (West Virginia) Counties through Potomac Valley Television Company (20,000 subscribers); and Allegany, Garrett and Mineral Counties through Upper Potomac Television Company, Inc., (2,050 subscribers). Better Vision Systems, Inc., of Oakland, Maryland, serves Garrett, Mineral and Grant (West Virginia) Counties through a direct cable network (1,100 subscribers). Antietam Cable Television of Hagerstown, Maryland, serves Washington County and the Washington County Public Schools through a direct cable network and a closed circuit network, respectively, (8,000 subscribers). Tri-State Cable TV, Inc., of Hancock, Maryland, serves Washington, Fulton (Pennsylvania), Franklyn (Pennsylvania) and Morgan (West Virginia) Counties through an administrative agreement with local CATV companies (3,800 subscribers). Keyser Television Company, Inc., of Keyser, West Virginia, serves Allegany and Mineral Counties through a direct cable network (3,400 subscribers). These major TV signal distributors account for 40,950 subscribers, 91% of the total subscribers in the area.

Figure 3 displays the current and planned translators for distributing a Public Broadcast Service (PBS) signal throughout the area of interest. The Maryland Center for Public Broadcasting (WMPB) schedules in-school service programming between 7:00 a.m. and 4:00 p.m., and general programming during the remainder of its broadcast time. The Pennsylvania State University (WPSX) and the West Virginia State University (WWVU) both schedule their in-school service programming between 8:30 a.m. and 3:30 p.m., and general programming thereafter.

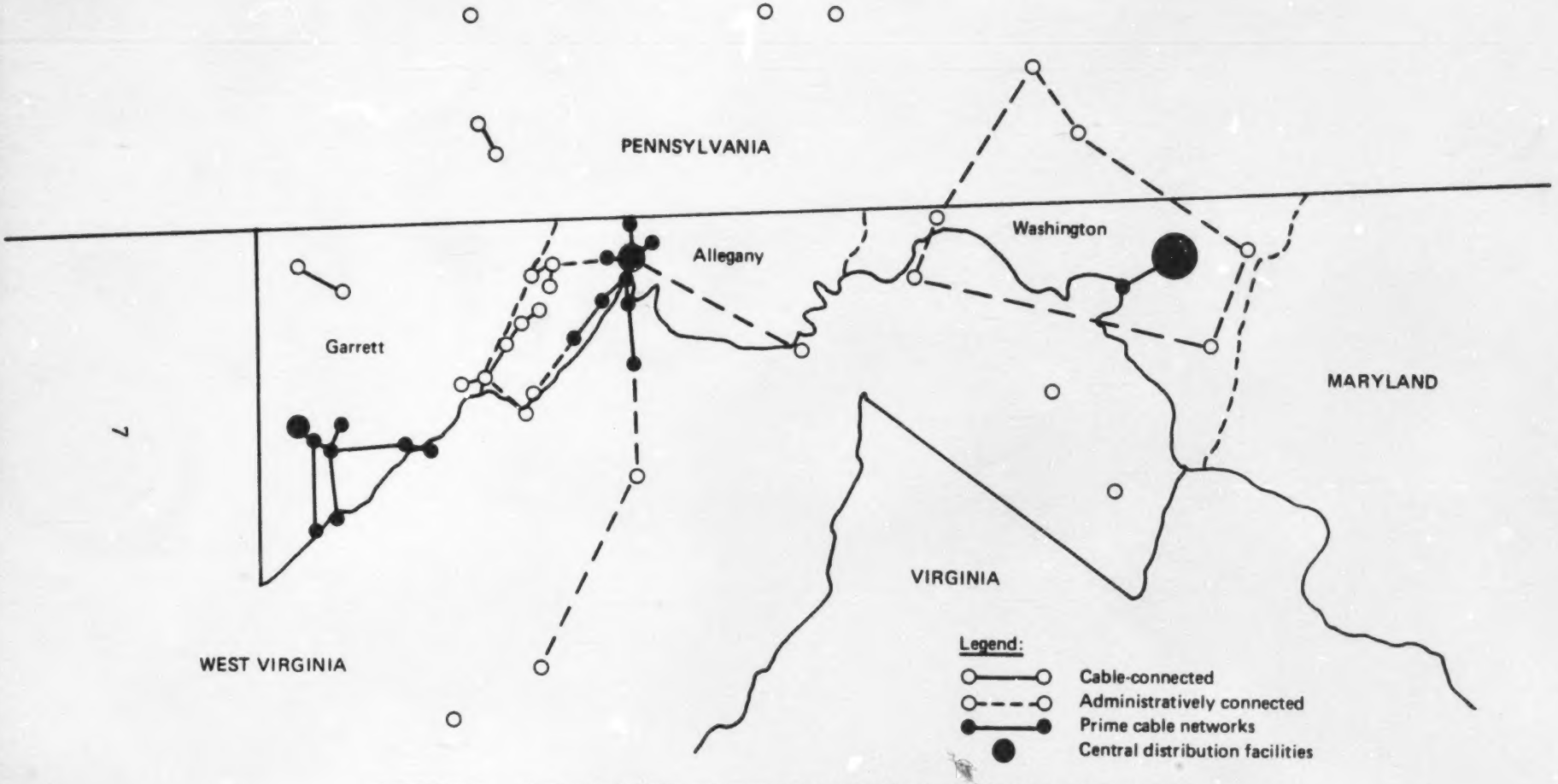

FIGURE 2. COMMERCIAL CABLE TELEVISION (CATV) COMPANIES IN APPALACHIAN MARYLAND AND IN ADJACENT PENNSYLVANIA AND WEST VIRGINIA

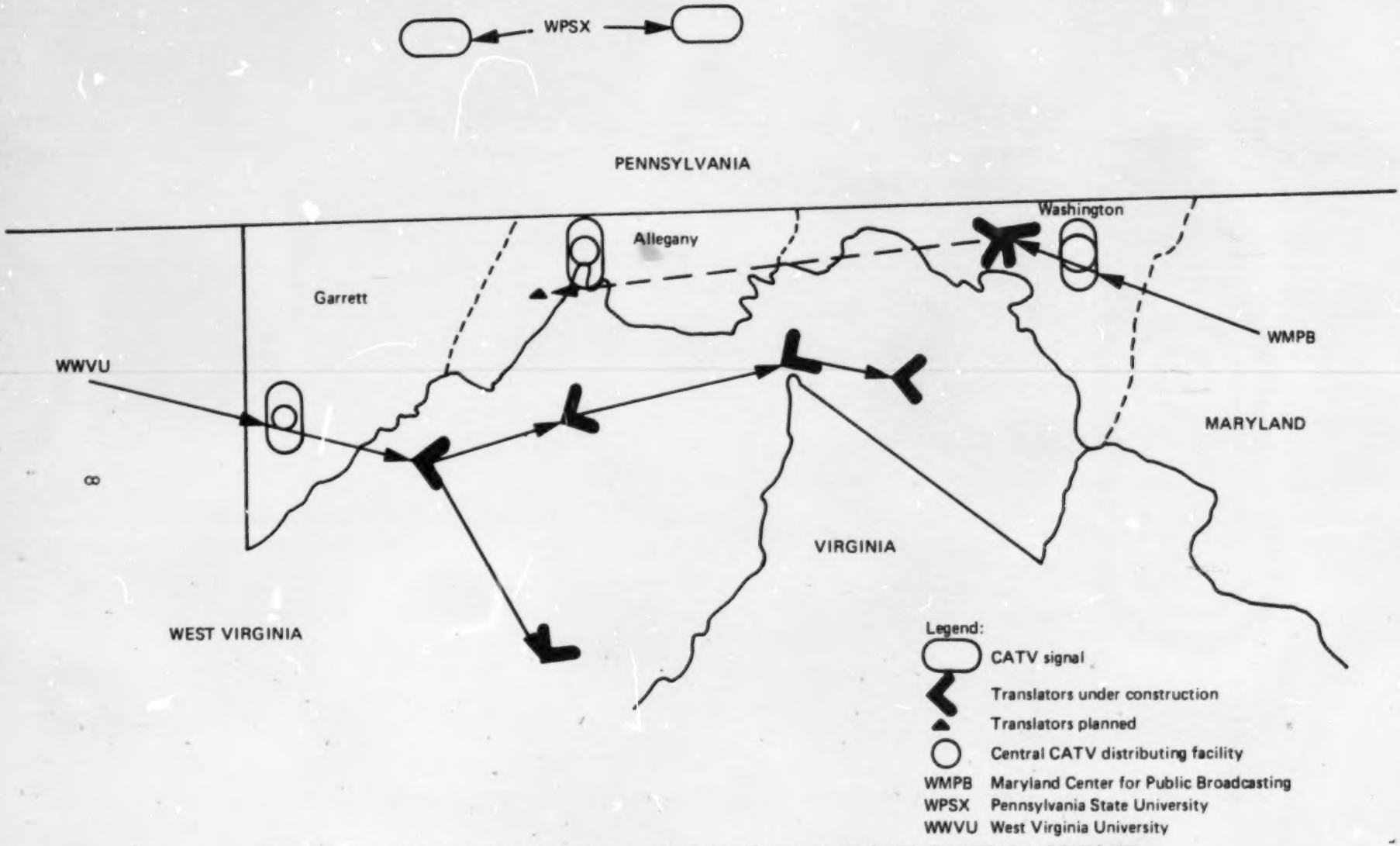

FIGURE 3. PUBLIC BROADCAST SERVICE (PBS) SERVING APPALACHIAN MARYLAND AND ADJACENT PENNSYLVANIA AND WEST VIRGINIA

APPALACHIAN ATS-F SATELLITE EXPERIMENT

ARC recently proposed an educational communications experiment in Appalachia to test the use of educational technology in improving classroom teaching skills in selected subjects. Their request for proposal (RFP) (Appalachian Regional Commission, 1973, p. 1) states:

> The Appalachian Regional Commission (ARC), in conjunction with the U.S. Office of Education, plans to demonstrate the use of educational technology as a means to strengthen existing local education programs in Elementary Reading and Career Education. Focusing on in-service education for improvement of classroom teaching skills, the demonstration will afford local teachers the unique opportunity of participating in the process of developing instructional units from materials available from diverse sources. ... The delivery system for distribution of instructional materials is designed to link teachers at five existing Regional Education Service Agencies (RESAs) and other remote, rural sites to a Resource and Coordination Center (RCC) via the Applications Technology Satellite - F (ATS-F) and other communications systems.

And in describing the relationship between the RCC and the RESAs, the RFP (p. 2) further states:

> The RCC will receive and transmit TV programming, supplementary print material, and computer-based program information in Elementary Reading Education and Career Education (K-12) to teachers at RESA sites and local schools. ... RCC-RESA communications will involve mainly transmission of TV programming (live and pre-recorded), two-way voice communications for a seminar course and access to the RCC computer for teachers to obtain information in their development of instructional units.

The general educational objectives of this experiment are:

- Expand the delivery capability of in-service training programs in elementary reading and in career education to larger numbers of rural teachers
- Design and implement career courses that will prepare rural Appalachian teachers to be more effective

in persuading graduates to take advantage of appropriate post-secondary opportunities

- Design and implement primary in-service reading improvement courses that will prepare rural Appalachian teachers to be more effective in cultivating individual student reading skills
- Demonstrate the feasibility of providing teachers on the local level with the necessary comprehensive in-service education to improve classroom techniques
- Demonstrate the feasibility of directly involving teachers and administrators on the local level in the development of curriculum in Career Education (K-12) and Primary Reading Education for local implementation
- Utilize and improve the effectiveness of Appalachian RESAs for delivering quality education programs through communication systems
- Generate information for the design of future large-scale resource sharing arrangements that cut across local and state boundaries utilizing high-power satellites and other communications forms for the delivery of various educational services in remote locations.

Phase I of the program, the planning phase, is just now in the process of being implemented; thus, there is no firm plan for the goverance and conduct of the program. There is, however, the desire to establish three RESA Centers in each of the five RESA areas as the focii for the RCC-RESA in-service teacher training programs. Due to the relatively low cost of the down link (i.e., signal receiving site) antenna envisioned for use in this experiment (in the range of $15,000 to $25,000 each), it is most probable that each RESA Center will have its own antenna. An alternative design would be to have a single down link antenna and a distriburion network from there to the Centers. However, the substantially higher cost of distributing the signal over either leased telephone lines or line-of-sight microwave relay towers reduces the probability that this design will be selected. The need to transmit voice and computer signals back from the Centers to the RCC further complicates this issue.

Although Phase I will develop the specifics of the experiment to be implemented in Phases II (Preparation) and III (Operation), it is anticipated that the Centers would be the location for classroom activities and computer remote terminals. The teachers selected to participate in the program (approximately 100 from each RESA area) would, therefore, commute between their normal work-site and one of the Centers. Figure 4 presents a schematic of

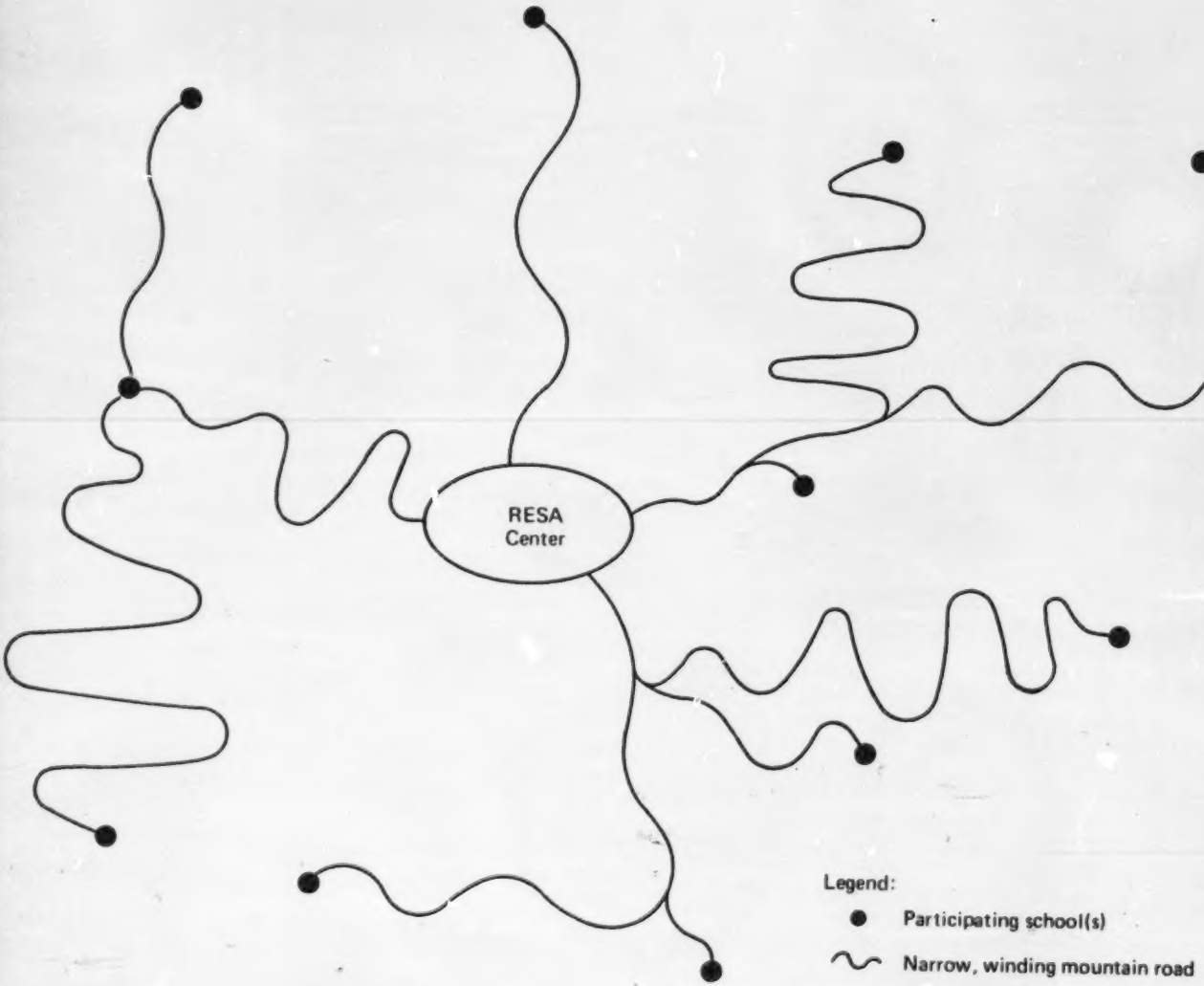

FIGURE 4. ILLUSTRATION OF A HYPOTHETICAL ROADWAY NETWORK CONNECTING A RESA CENTER AND THE SCHOOLS OF ITS PARTICIPATING TEACHERS

this situation, where teacher work-sites or schools surround a RESA Center and roads connecting the Center to the schools are illustrated for effect. The "scribbily-lines" represent the typical narrow, winding mountain roads of Appalachia. The Centers will probably be located in or near population centers, thus, at or near a main crossroad, as depicted.

The success of this innovational use of educational technology may well establish new frontiers for in-service training of Appalachian teachers. Indeed, its success may enhance the in-service training posture of other professionals in Appalachia (e.g., health, police, fire, business).

INTERFACE BETWEEN COMMUNITY ETV AND ATS-F

The ATS-F satellite experiment will exert a strong influence on Appalachian Maryland's community ETV project. In order to prevent this influence from establishing an ETV delivery system suited only for the more limited in-service teacher training program, a point of departure for planning the ATS-F experiment is suggested below to ensure that the two projects interface. This integration of the missions of both projects will yield an ETV delivery system which simultaneously maximizes the attainment of the goals of both.

The most critical issue facing the integration of the two delivery systems is that of signal distribution requirements. The community ETV concept requires that the signal be distributed directly to both the home and the work-site. It has been postulated that the ATS-F experiment's signal distribution requirements are less severe because it can operate with a fixed-site RESA Center, with the teachers commuting on both a scheduled basis for classwork and an unscheduled basis for access to the computer.

The topographical realities of Appalachia would preclude commuting on a regular, extended basis, particularly during the winter-snow and spring-rain seasons. Rural Appalachian roads are typically torturous mountain roads, winding along exposed ridges as they connect the valleys between adjacent ridges. These roads are seldom more than two-lanes wide, often badly pock-marked from extensive truck traffic and slippery during periods of precipitation and high winds. Furthermore, the roads connecting population centers tend to travel either across the ridges or down the valleys between the ridges, presenting a checkerboard effect. Thus, commuters would have to travel much greater distances, along the "edges" of the "checkerboard squares," as illustrated in Figure 4. It becomes rapidly obvious that the further isolated a rural teacher is, the lower the probability is that the teacher can participate in the experiment; especially from early Winter through late Spring. The urban-based teacher, on the other hand, is encouraged to participate. Although all Appalachian teachers need and want this form of professional support and growth,

the rurally isolated teacher, who does not have an educational community within which communication and consultation are readily available, has a greater need for the program, but less opportunity to fully participate in it.

Since the fixed-site concept for the RESA Center would work a severe hardship on those teachers whose need for the program is greatest, it would follow that distributing the ATS-F signal to the teacher's work-site would facilitate their participation in the experiment. Thus, the signal distribution requirements for community ETV and for the ATS-F experiment merge and can be integrated.

Marchese (1972, p. 13), in an article on the use of cable television networks for ETV, introduces the concept of micro- and macro-distribution systems:

> ... the systems used to transport program, film or tape, to the home receiver will be considered to be broken down into two types: interconnection and distribution. Interconnection systems link distribution systems. Distribution systems are local in scope and interconnection systems serve a larger area.

Figure 2 displayed the cable networks serving Appalachian Maryland and adjacent West Virginia, and Figure 1 displayed the extent to which Maryland's public schools were cable-connected; thus, an expanded nucleus of distribution or micro-systems already exist. The ATS-F satellite, through appropriately located RESA Centers, can act as the interconnection or macro-system.

Figure 5 displays a hypothetical interconnection system or signal distribution network connecting a RESA Center and its participating schools. In this case the Center was located at or near a signal distribution site to facilitate its operations. The down link antenna is located on or connected to the terrestial transmission tower. Thus, the ATS-F signal is received at the down link antenna, converted at the signal distribution site, transmitted via a terrestial-based network to local CATV companies and distributed to the cable-connected schools and homes. One oversimplification in Figure 5 is the distinct CATV company associated with each school(s). In reality, the same CATV company may serve several of the school sites and adjacent homes simultaneously.

The two weak points in the argument to distribute the ATS-F signal to local schools have been thus far ignored: (1) some schools are not cable-connected, and (2) the ATS-F experiment calls for two-way voice communication and computer communication. There are two ways of treating the question of schools without cable connections. The first, and also most expensive, is to erect a microwave relay system that would receive the RESA Center signal and distribute it to the unconnected schools. The second, and more feasible, is

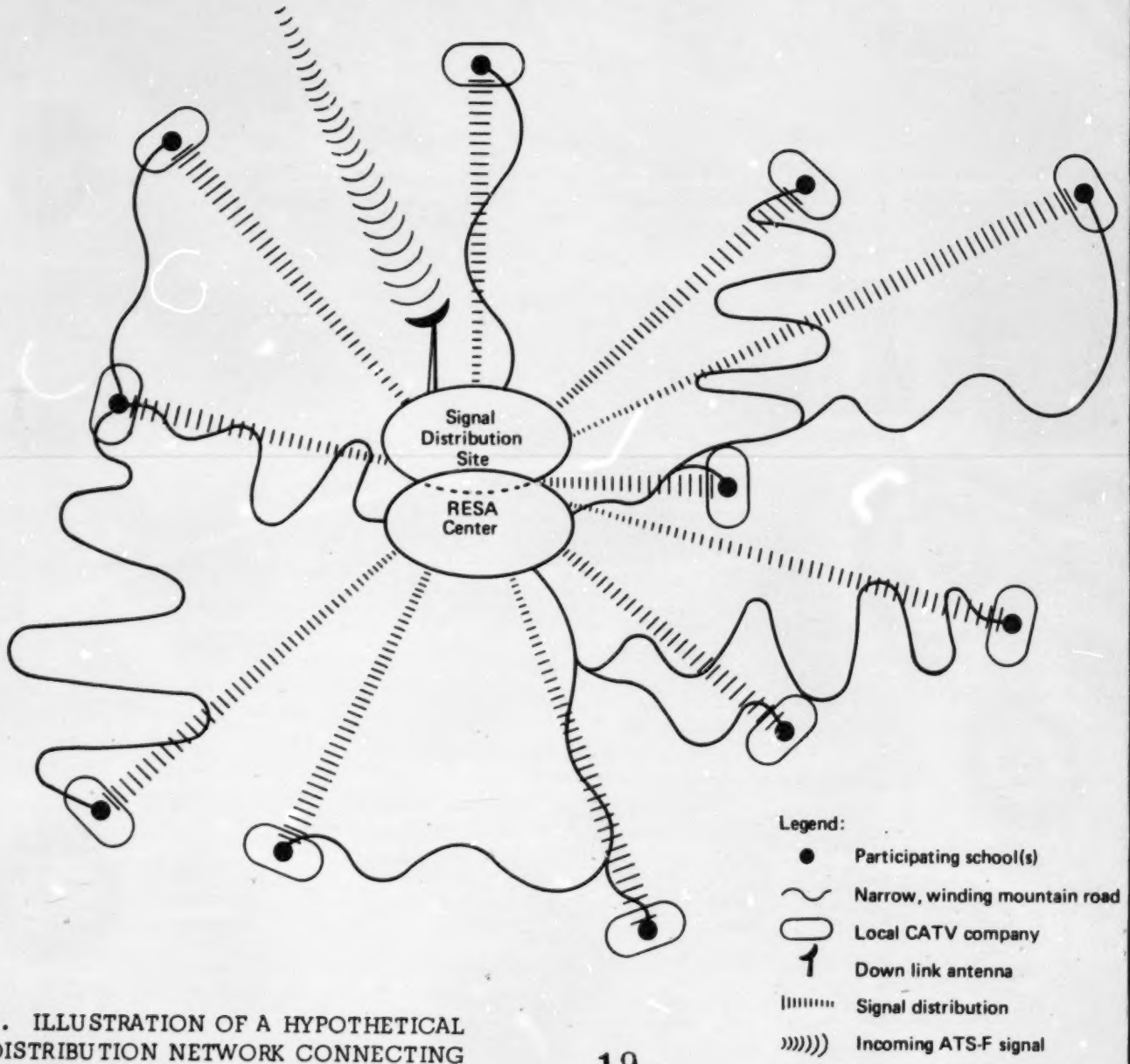

FIGURE 5. ILLUSTRATION OF A HYPOTHETICAL SIGNAL DISTRIBUTION NETWORK CONNECTING A RESA CENTER AND SCHOOLS OF ITS PARTICIPATING TEACHERS

to transport the teacher to the nearest school, municipal building (e.g., fire-house, police station, town hall) or local industry which is cable-connected, even though it is located in a different county or state. In this case the teacher may have to leave the work-site (it may be that the teacher happens to receive the signal at home), but the distance is far less than to the RESA Center. Thus, the participation-versus-hardship trade-off is optimized.

The question of two-way voice and computer communication cannot be so easily treated. Most of the local CATV companies do not have the capability for two-way communications between themselves and the communities they serve or between themselves and the RESA Center. Furthermore, the local schools typically do not have the capability to support the teachers in their effort to communicate with the RCC computer. One solution is to have the teachers commute to the Center only when they are involved in real-time classroom interaction with the RCC instructor or when they need to use the computer. The two-way voice communications problem can be solved in another way, by setting up a local Wide-Area-Telephone-Service (WATS) system connecting the teachers with the RESA Center so that real-time questions can be accepted at the Center, forwarded directly to the RCC via ATS-F and the real-time response received directly by the teachers. Since there is a possibility that there may not be a real-time classroom interaction with the RCC, but that questions asked by the teachers at the end of one session will be responded to at a later time, the WATS concept becomes most feasible. The two-way computer communication can be treated in the same manner via the WATS system. For most purposes the teacher can telephone computer resource requirements to a RESA Center specialist and receive computer output by return mail.

Through the use of nearest-point cable reception, local CATV companies and a local WATS system the requirements of the ATS-F experiment can be satisfied (although parts of the system are simulated) and even the most isolated teacher involved. The only question still remaining unaddressed is, "Will the CATV companies cooperate?" For the purposes of the short duration, limited application of the ATS-F experiment, the most likely answer is no. On the other hand, since the wide-area distribution and continuing aspects of the experiment can form the teacher needs portion of a community ETV system, the CATV companies will most likely answer yes.

There are some very compelling reasons why the CATV companies will cooperate with a community ETV project. Although most of Appalachia's population is outside of the top 100 markets and very few local CATV companies have over 3,500 subscribers, so that they are not affected by the FCC program origination ruling of March 1972, many have begun origination of programming either as a public service or in anticipation of this requirement (Marchese, 1972). According to Peters (1971, p. 4) a CATV company:

> ... can expect to increase its subscribers by 10 percent, if it offers a reasonable series of automated

> local/live and prerecorded programs. This increase in number represents an increase in potential monthly revenue of $500 per 1,000 subscribers in the system.

From these two concerns Marchese (1972, p. 4) derives that:

> ... it may be expected that CATV operators who are anxious to program new material and attract subscribers will be interested in cooperating with development districts, community organizations, or other service agencies by donating cable time for programming.

RECOMMENDATIONS FOR IMPLEMENTATION

If the system is feasible, how then can it be implemented? The previous arguments have demonstrated the feasibility of integrating the simultaneous missions of the ATS-F experiment in Appalachian Maryland and the Appalachian Maryland community ETV project; of simulating an ETV system with the RESA Center(s) and local CATV companies; of obtaining cooperation from local CATV companies by exchanging cable time (possibly mandated by an FCC ruling) for programming of interest to the community. The implementation is both straightforward and practical:

Washington County, Maryland

Figures 1 and 2 show that Washington County has a solid base for a community ETV system. By placing the RESA Center with its down link antenna and converter in the Washington County Public Schools, the signal can be distributed to all schools and many homes via Antietam Cable TV. By further allowing the Maryland CATV companies associated with Tri-State Cable TV, Inc., to connect into the system via a cable link-up to the nearest school the signal can be distributed throughout Washington County (although this may call for simple modifications in the links to those schools).

Allegany County, Maryland

Figures 1 and 2 show that the western half of Allegany County (the bulk of its population) likewise forms a solid base for a community ETV system. By placing the RESA Center with its down link antenna and converter at Allegany Community College, the signal can be distributed to most of the schools

and many homes via Potomac Valley Television Company and the microwave distributing company Western Maryland Communications, Inc. Through this network a number of West Virginia communities can also receive the ATS-F signal through an Allegany Community College RESA Center.

Garrett County, Maryland

Figures 1 and 2 show that Garrett County has the least to offer as a base for a community ETV system. However, there is some CATV coverage in the southern part of the county (the bulk of its population) which coincides with six of the 11 schools in the county and serves three West Virginia communities as well. By placing the RESA Center with its down link antenna and converter at or near the Garrett County Public Schools, and connecting this site, with a transmitter cable, to the Better Visions Systems, Inc., the signal can be distributed to approximately 1,100 homes in Garrett County and adjacent West Virginia. In this case it would be necessary to extend cables to the schools in the served areas or to make arrangements for the teachers to use a cable-connected set in a municipal building, business or home in their community.

The public broadcasting services of either Maryland, WMPB, or West Virginia, WWVU, are received by every CATV company; thus, it is possible to accomplish a distribution system through PBS for the ATS-F experiment. This would require that a down link antenna and converter be placed at WMPB and at WWVU. However, PBS has only one channel which is rigorously scheduled, while CATV can make several channels available, all unscheduled. Thus, as the TV delivery system expands from the ATS-F experiment to a community ETV system, the PBS capability will become overloaded. Instead of using PBS as a basis for a community ETV system, it is better suited to augment the ETV system with general and special purpose, in-school programming. Further, the capability of local programming origination is highly desirable and resources exist for such an effort.

The adoption of the plan suggested above, or one similar to it, will satisfy the requirements of the ATS-F experiment while forming the kernel of a community ETV system, for little or no additional cost. A bonus of this plan is that all interested teachers not enrolled in the experiment may audit the courses, while the enrollees can act as team leaders for the auditors.

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